UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/680,379	10/06/2003	Hagen Klauk	MUH-12807	5870

27346 7590 07/28/2008

LERNER GREENBERG STEMER LLP
FOR INFINEON TECHNOLOGIES AG
P.O. BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER	
CHACKO DAVIS, DABORAH	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
07/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/680,379	KLAUK ET AL.	
	Examiner	Art Unit	
	DABORAH CHACKO DAVIS	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-15, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,942,374 (Smayling) in view of Japanese Patent No. 09-083040 (Aomori et al., hereinafter referred to as Aomori) and U. S. Patent No. 5,811,358 (Tseng et al., hereinafter referred to as (Tseng).

Smayling, in the abstract, in col 1, lines 58-67, in col 2, lines 1-16, in col 5, lines 21-67, discloses a method of doping an organic conductive layer wherein a substrate is coated with a polyimide, and doped with a dopant gas followed by exposure through a mask to radiation so as to form a doped region (fixing the doping substance in the polyimide layer via a covalent bond, i.e., conjugated sequences of single and double bond, the doped region becomes conducting). Smayling, in col 10, lines 12-17, discloses that the remaining portion (less doped, residual dopant) of the mask layer (polyimide or PR) is removed. Smayling, in col 6, lines 56-67, discloses a gate electrode provided with a layer that is less transmissive (a more absorbing layer, light opaque regions) above the gate electrode resulting is a less irradiated region (unexposed sections). Smayling, in col 5, lines 35-42, discloses that the organic layer is heavily irradiated so as to

form a doped and undoped region in the polyimide layer such that the source and drain regions are in electrical contact with the doped portion of the doped polyimide region having increased electricity (see figure 1, current flows from reference 18 to reference 20 via channel reference 24). Smayling, in col 1, lines 57-67, in col 2, lines 1-17, in col 4, lines 1-54, discloses that the substrate is transparent to radiation (glass), forming source region, drain region spaced apart from the gate region, forming a gate dielectric (gate insulating region) positioned spaced apart from the source and drain regions (first and second region) and spaced apart from the gate electrode, wherein the source, the drain, the gate insulator, the gate electrode are spaced apart with the organic semiconducting layer. Smayling, in col 10, lines 1-29, discloses that after the removal of the undoped regions of the mask, the now exposed regions (masked previously) of the polyimide is restored i.e., the neutral polyimide in the unexposed regions that were previously n-doped and p-doped regions, after the removal of the mask layers, is restored to its original conductivity (claims 1-3, 6-9, 12). Smayling, in col 5, lines 43-49, in col 7, lines 1-8, discloses that the exposure is performed section by section (selectively scan one portion at a time) (claims 4, 10-11). Smayling, in col 6, lines 56-58, discloses that the exposure is performed through a mask (claim 5). Smayling, in col 1, lines 65-67, in col 2, liens 1-3, discloses that the source region, the drain region and the gate region are simultaneously formed on the substrate (claim 13). Smayling, in col 10, lines 60-67, discloses that the gate insulating material includes material transparent to radiation (transmissive regions, reference 20a of layer 16, see figure 15) (claims 14-15).

The difference between the claims and Smayling is that Smayling does not disclose that the doping substance in the organic compound is in regions adjoining the source contact and the drain contact. Smayling does not disclose that the organic semiconductor is applied directly with the contact region to the substrate. Smayling does not disclose that the unbounded doping substance is removed at reduced pressure or elevated temperature.

Aomori, in the abstract and in figures 1a through 1d, discloses that the organic semiconductor layer (reference 7) is in direct contact with the contact region and the doping substance in the organic semiconducting layer is in the region that adjoins the source and drain contact.

The difference between the claims and Smayling in view of Aomori is that Smayling in view of Aomori does not disclose that the unbounded doping substance is removed at reduced pressure or elevated temperature.

Tseng, in col 2, lines 65-67, in col 3, lines 1-3, and in col 4, lines 10-14, discloses that the remaining part of the implant-hardened photoresist is removed via stripping at elevated temperatures.

Therefore, it would be obvious to a skilled artisan to modify Smayling by employing the method of contacting the contact region via the organic semiconducting layer and maintaining the doped substance in a region that adjoins the source and drain contact because Smayling, in col 8, lines 26-58, discloses that interconnect polymer layer (organic semiconducting layer) is formed on the contact regions (contacts) and the interconnect polymer layer has been irradiated i.e., it has a dopant concentration, and the interconnect layer is

positioned in a region between the contacts (source and drain), and Aomori, in the abstract, discloses that employing a organic semiconducting layer in the claimed manner enables the formation of a high performance thin film transistor. Therefore, it would be obvious to a skilled artisan to modify Smayling in view of Aomori by employing elevated temperatures while removing the unbound doped substance present in the resist to be removed as taught by Tseng, because Tseng, in col 4, lines 1-220, discloses that elevating the temperatures during the stripping process, that removes a portion of the photoresist that has unbound dopants (implants) enables better efficiency by effectively stripping the photoresist at an increased reaction rate.

Response to Arguments

3. Applicant's arguments filed March 27, 2008, have been fully considered but they are not persuasive. The 103 rejection made in the previous office action (paper no. 20080104) has been maintained.

A) Applicants argue that Smayling does not disclose the removal of unbounded doping substance.

Smayling teaches doping a polyimide layer selectively (see col 10, lines 1-30) and the unbound doping substance present atop the organic compound (i.e., the polyimide layer) is removed i.e., reference 58, of figure 13, is the portion that contains unbound doping substance, and is removed after the irradiation process. The doped regions are formed in the polyimide prior to removal of unbounded doped substance; In col 4, lines 33-37, discloses that the neutral

polyimide is irradiated and lightly doped regions are formed. After which, as referenced in the first sentence, the neutral polyimide portions, reference 58, is removed i.e., unbounded doped substance is removed.

B) Applicants argue that Smayling's reference 58 is a masked region and not an n-doped region.

Smayling, in col 10, lines 15-17, discloses that the reference 58 is an n-doped region (i.e., a conductive mask layer) formed when using dopant gases such as phosphene or arsene.

C) Applicants argue that Smayling does not disclose that exposed region 54 is removed.

The region with the unbounded substance, reference 58 of figure 13, is removed and has been addressed in argument A) above.

D) Applicants argue that Smayling does not teach that the dopant applied to the first exposed region is removed.

Claims 1, and 9, do not recite that the unbounded doping substance is removed from an exposed region. The claims recite removing unbounded doping substance i.e., the unbounded substance can be dopants either in the masked or unmasked regions i.e., unexposed or exposed regions, and Smayling in col 4, lines 33-37, discloses the presence of lightly doped regions in the neutral polyimide layer prior to being masked and etched with the photoresist layer (PR layer not shown, see figure 13).

E) Applicants argue that Smayling does not disclose an organic semiconductor compound or an electrically conductive organic compound.

The unbounded substance removed is referenced as reference 58 in figure 13, and in col 10, lines 22-23, discloses that the reference 58 is that of a neutral radiation sensitive layer. Smayling, in col 1, lines 59-63,disclsoes that the radiation sensitive layer material (whether doped or undoped) can include a semiconductor or a conductor i.e., the compound is an organic semiconductor or an electrically conductive organic compound.

F) Applicants argue that neither Smayling nor Tseng discloses removing the unbounded substance at reduced pressure or elevated temperature from the organic compound after exposure.

Smayling teaches the removal of unbounded substance from an organic compound after exposure. See arguments A), and D) above. Tseng is not depended upon to disclose the removal of unbounded substance from an organic semiconductor or an electrically conductive organic compound. Tseng is depended upon to disclose the removal of unbounded doping substance at elevated temperatures (see col 3, lines 61-64).

G) Applicants argue that photoresist is not an unbounded doping substance, and Tseng discloses stripping of the photoresist and not removal of unbounded doping substance.

Tseng in col 3, lines 61-64, discloses an implant hardened photoresist being stripped i.e., the photoresist desired to be removed is an organic compound, implanted with dopants, therefore having unbounded doping substance in it and is being removed i.e., unbounded doping substance is removed. However, Tseng is only relied upon to disclose removal of unbounded

dopants at elevated temperatures. Smayling is depended upon to disclose the removal of unbounded doping substance.

H) Applicants argue that Tseng does not disclose the removal of doping substances present in an organic/electrically conductive layer.

Tseng is not depended upon to disclose an organic/electrically conductive layer. Additionally, the photoresist implanted with dopants is inherently conductive. Smayling, as discussed in argument F) above discloses an electrically conductive radiation sensitive layer.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 -

6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

/Daborah Chacko-Davis/
Examiner, Art Unit 1795

July 21, 2008.